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Kim

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(54) **METHOD FOR SUPPLYING LOCAL SERVICE USING LOCAL SERVICE INFORMATION SERVER BASED ON DISTRIBUTED NETWORK AND TERMINAL APPARATUS**

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(30) **Foreign Application Priority Data**

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(51) **Int. Cl.**
H04W 4/02 (2009.01)
G06F 17/30 (2006.01)
H04L 29/12 (2006.01)

(52) **U.S. Cl.**
CPC ***H04W 4/02*** (2013.01); ***G06F 17/3087*** (2013.01); *H04L 61/2015* (2013.01)

(58) **Field of Classification Search**
None
See application file for complete search history.

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(74) *Attorney, Agent, or Firm* — NSIP Law

(57) **ABSTRACT**

Provided are a method and apparatus for supplying a local service (LS) using a LS information server that is based on a distributed network. The LS may be supplied to the terminal through at least one of an LS information server, a root server, and a neighboring LS information server.

20 Claims, 12 Drawing Sheets

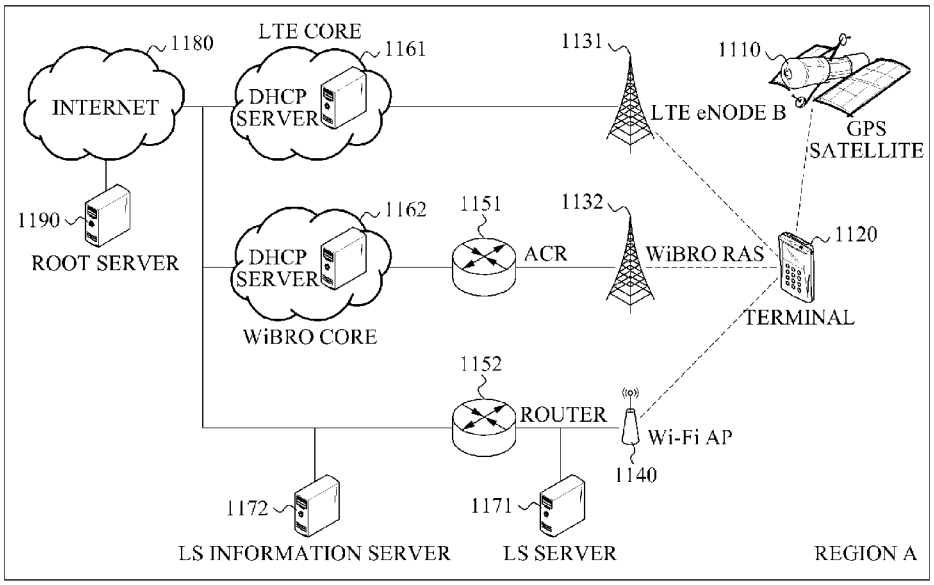


FIG. 1

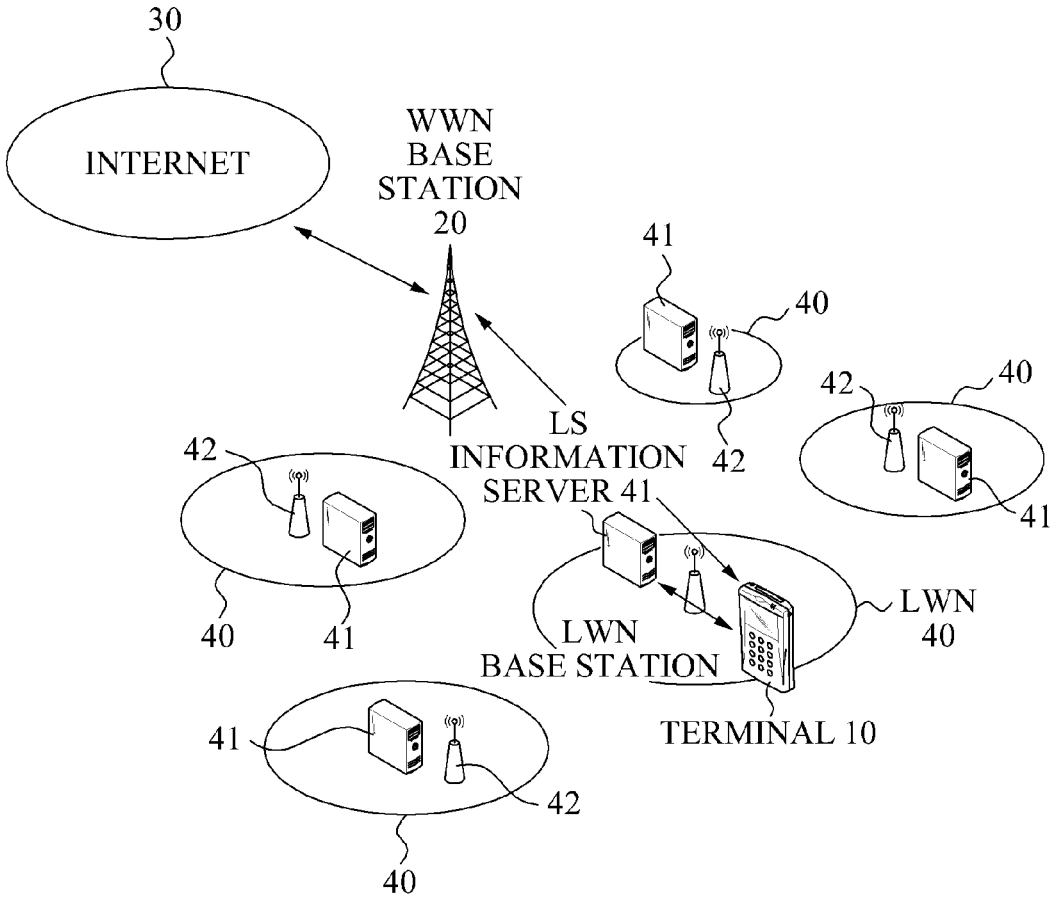

30
INTERNET
WWN
BASE
STATION
20
41
40
42
40
42
LS
INFORMATION
SERVER 41
42
41
40
41
LWN
40
LWN
BASE STATION
TERMINAL 10
41
42
40

FIG. 2

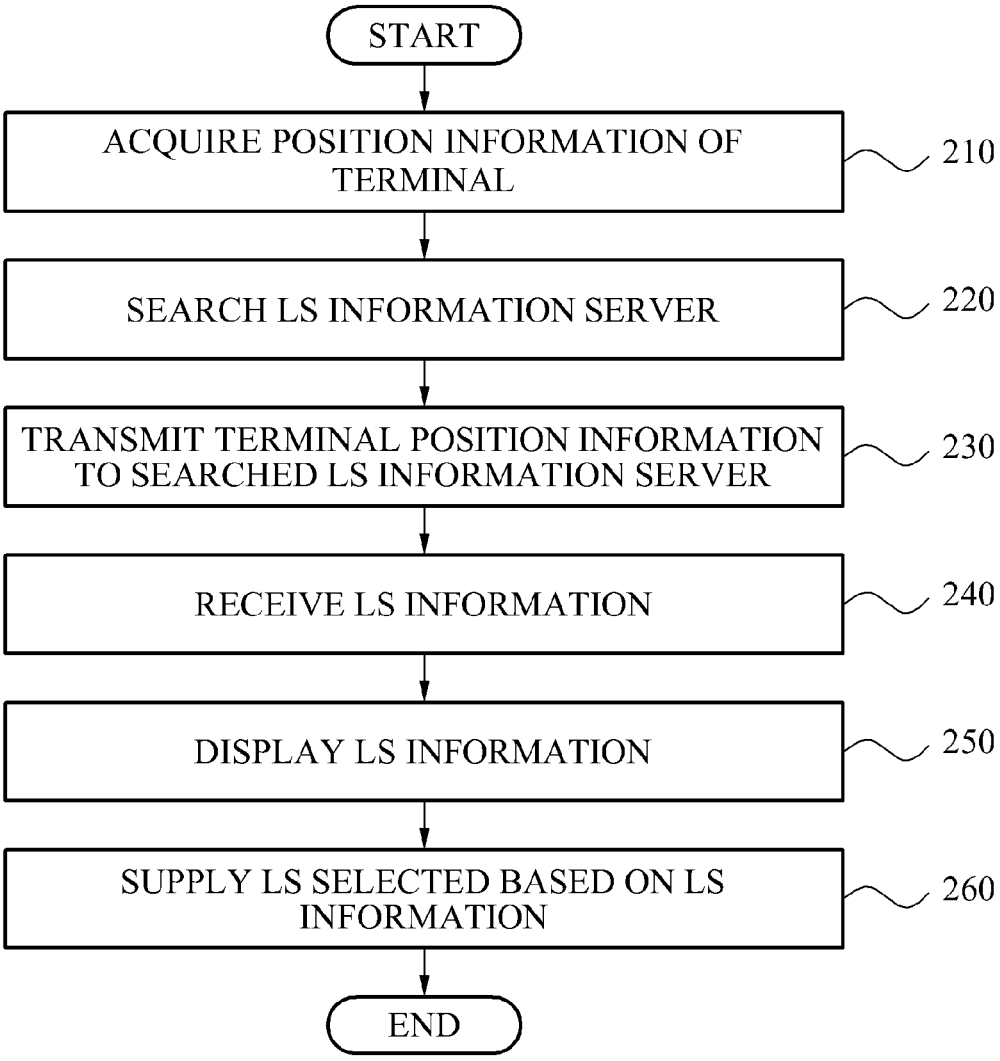

START
ACQUIRE POSITION INFORMATION OF TERMINAL
210
SEARCH LS INFORMATION SERVER
220
TRANSMIT TERMINAL POSITION INFORMATION TO SEARCHED LS INFORMATION SERVER
230
RECEIVE LS INFORMATION
240
DISPLAY LS INFORMATION
250
SUPPLY LS SELECTED BASED ON LS INFORMATION
260
END

FIG. 3

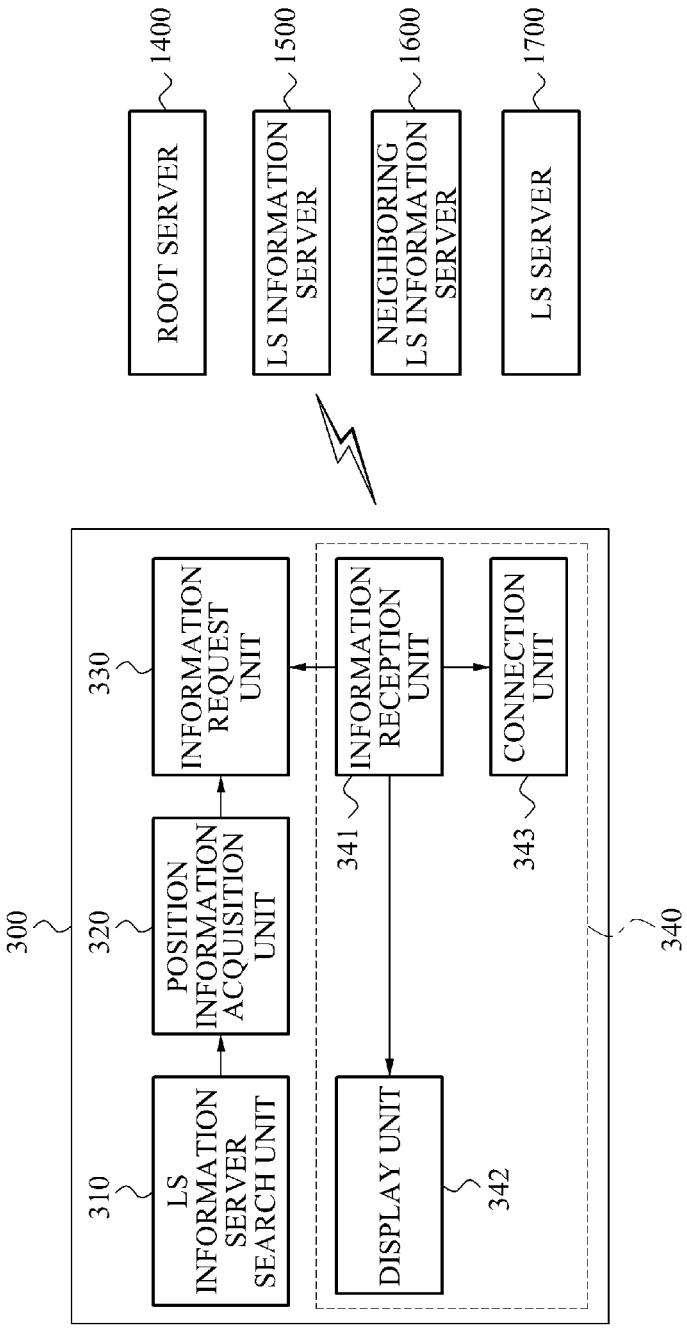

ROOT SERVER
1400
LS INFORMATION SERVER
1500
NEIGHBORING LS INFORMATION SERVER
1600
LS SERVER
1700
300
310
LS INFORMATION SERVER SEARCH UNIT
320
POSITION INFORMATION ACQUISITION UNIT
330
INFORMATION REQUEST UNIT
340
341
INFORMATION RECEPTION UNIT
342
DISPLAY UNIT
343
CONNECTION UNIT

FIG. 4

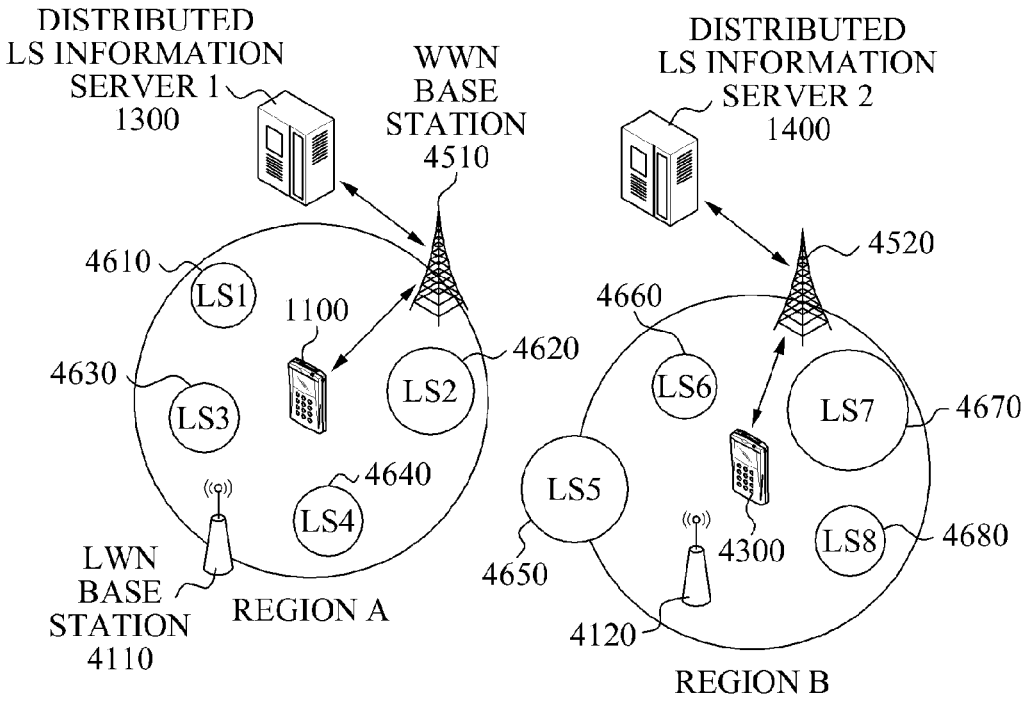

DISTRIBUTED
LS INFORMATION
SERVER 1
1300
WWN
BASE
STATION
4510
DISTRIBUTED
LS INFORMATION
SERVER 2
1400
4520
4610
LS1
1100
4620
4630
LS3
LS2
4660
LS6
LS7
4670
4640
LS4
LS5
4300
LS8
4680
4650
LWN
BASE
STATION
4110
REGION A
4120
REGION B

FIG. 5

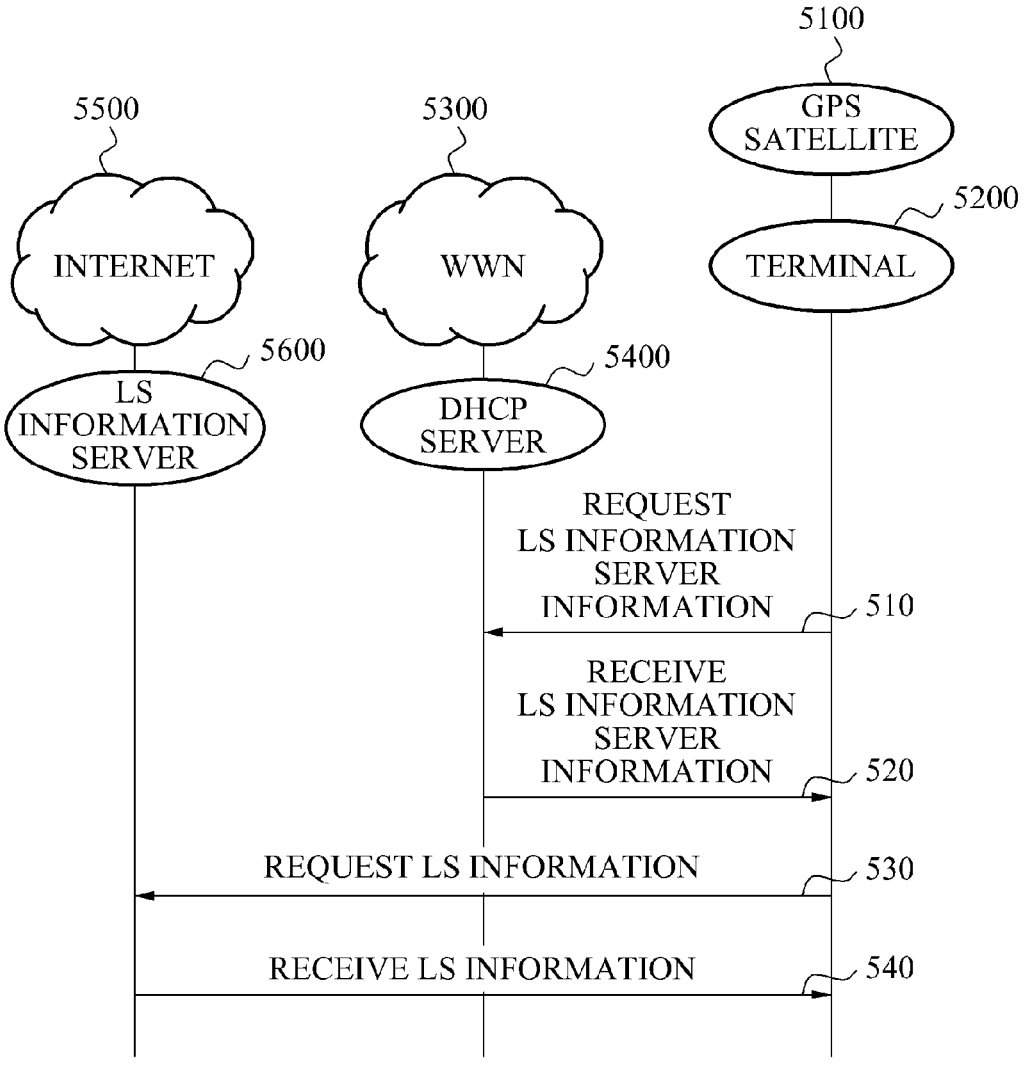

5100
GPS SATELLITE
5200
TERMINAL
5500
INTERNET
5600
LS INFORMATION SERVER
5300
WWN
5400
DHCP SERVER
REQUEST LS INFORMATION SERVER INFORMATION
510
RECEIVE LS INFORMATION SERVER INFORMATION
520
REQUEST LS INFORMATION
530
RECEIVE LS INFORMATION
540

FIG. 6

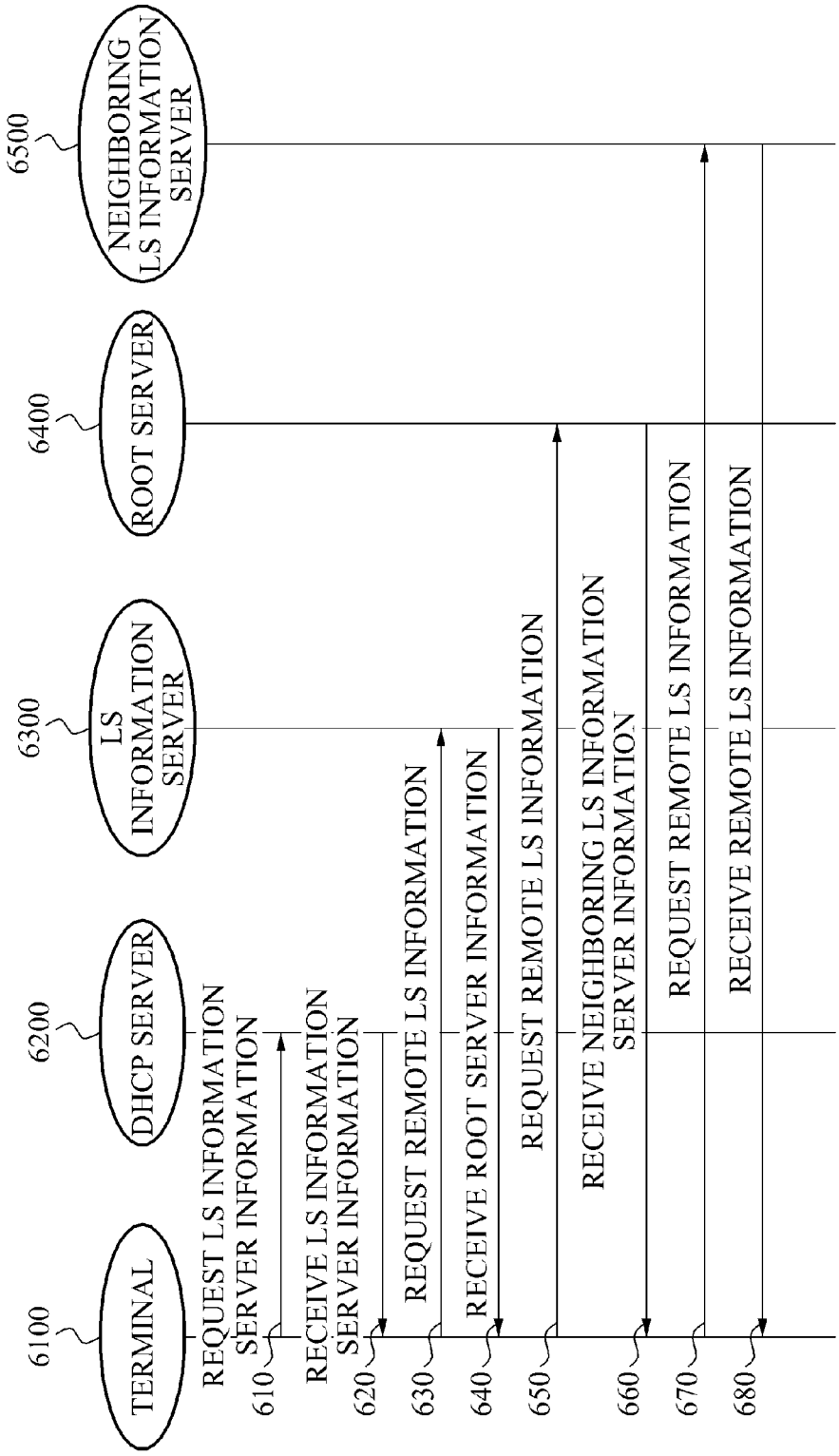

6100
TERMINAL
6200
DHCP SERVER
6300
LS INFORMATION SERVER
6400
ROOT SERVER
6500
NEIGHBORING LS INFORMATION SERVER
REQUEST LS INFORMATION SERVER INFORMATION
610
RECEIVE LS INFORMATION SERVER INFORMATION
620
REQUEST REMOTE LS INFORMATION
630
RECEIVE ROOT SERVER INFORMATION
640
REQUEST REMOTE LS INFORMATION
650
RECEIVE NEIGHBORING LS INFORMATION SERVER INFORMATION
660
REQUEST REMOTE LS INFORMATION
670
RECEIVE REMOTE LS INFORMATION
680

FIG. 7

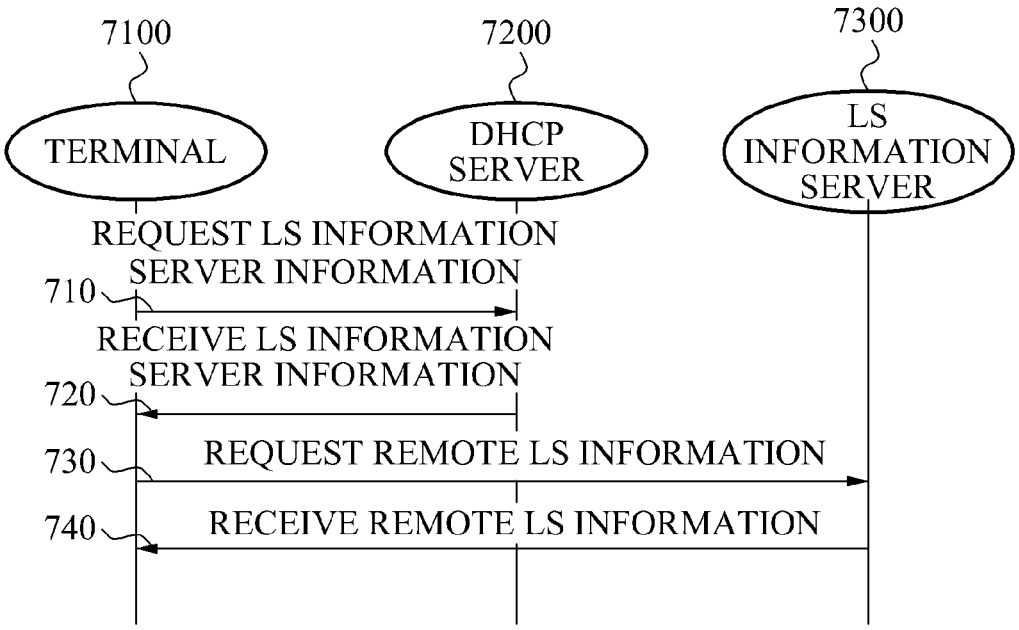

7100
7200
7300
TERMINAL
DHCP SERVER
LS INFORMATION SERVER
REQUEST LS INFORMATION SERVER INFORMATION
710
RECEIVE LS INFORMATION SERVER INFORMATION
720
730
REQUEST REMOTE LS INFORMATION
740
RECEIVE REMOTE LS INFORMATION

FIG. 8

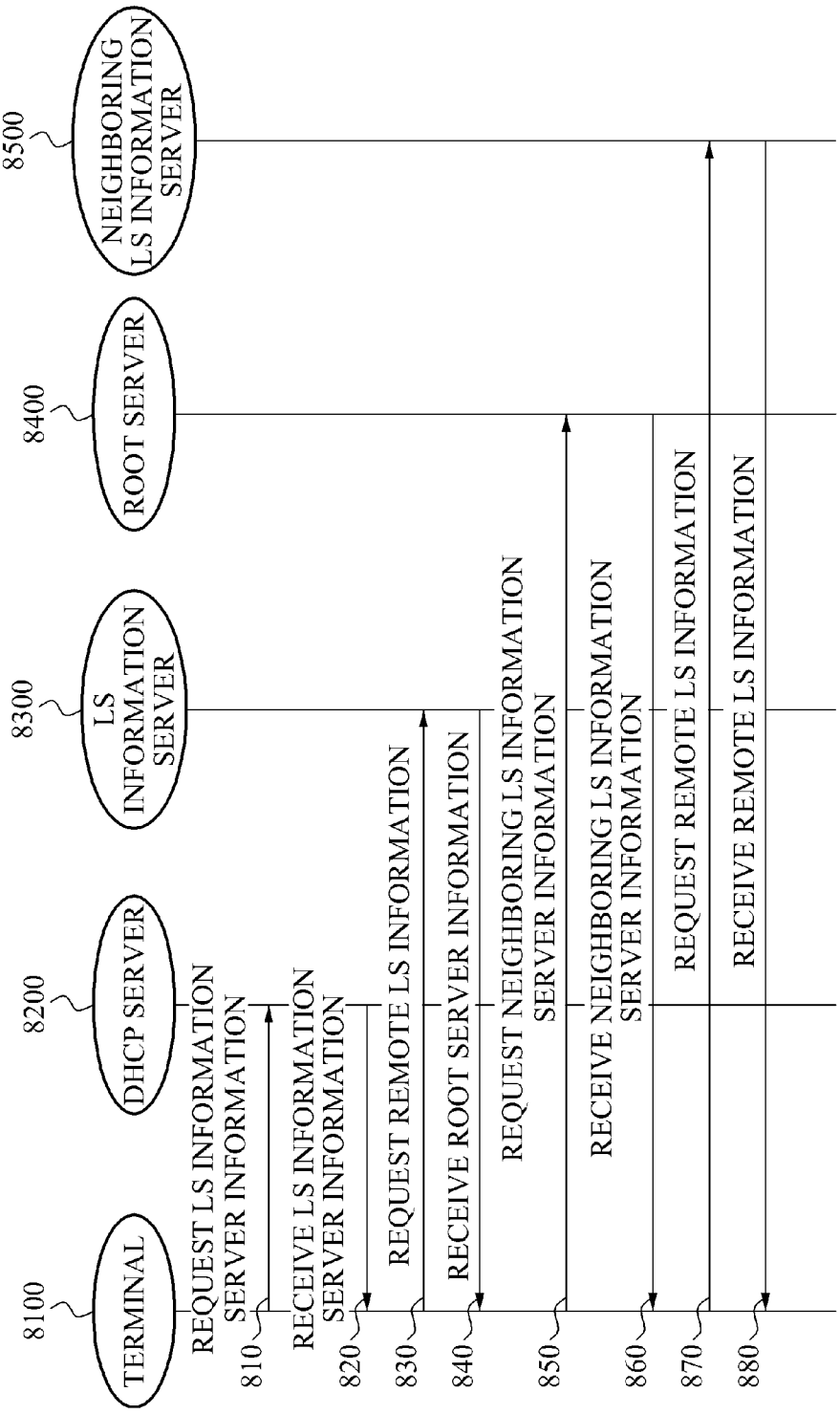

8100
TERMINAL
8200
DHCP SERVER
8300
LS INFORMATION SERVER
8400
ROOT SERVER
8500
NEIGHBORING LS INFORMATION SERVER
REQUEST LS INFORMATION SERVER INFORMATION
810
RECEIVE LS INFORMATION SERVER INFORMATION
820
REQUEST REMOTE LS INFORMATION
830
RECEIVE ROOT SERVER INFORMATION
840
REQUEST NEIGHBORING LS INFORMATION SERVER INFORMATION
850
RECEIVE NEIGHBORING LS INFORMATION SERVER INFORMATION
860
REQUEST REMOTE LS INFORMATION
870
RECEIVE REMOTE LS INFORMATION
880

FIG. 9

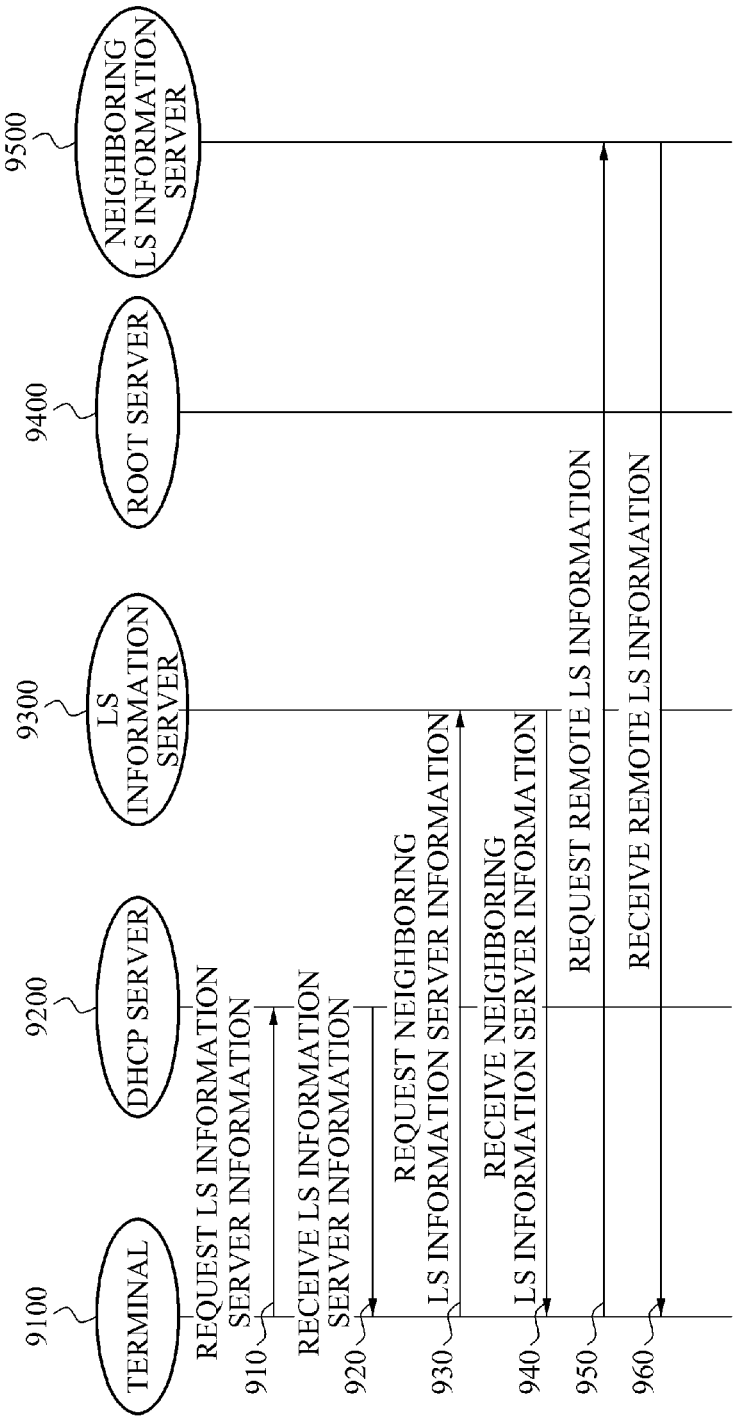

9100
TERMINAL
9200
DHCP SERVER
9300
LS INFORMATION SERVER
9400
ROOT SERVER
9500
NEIGHBORING LS INFORMATION SERVER
REQUEST LS INFORMATION SERVER INFORMATION
910
RECEIVE LS INFORMATION SERVER INFORMATION
920
REQUEST NEIGHBORING LS INFORMATION SERVER INFORMATION
930
RECEIVE NEIGHBORING LS INFORMATION SERVER INFORMATION
940
REQUEST REMOTE LS INFORMATION
950
RECEIVE REMOTE LS INFORMATION
960

FIG. 10

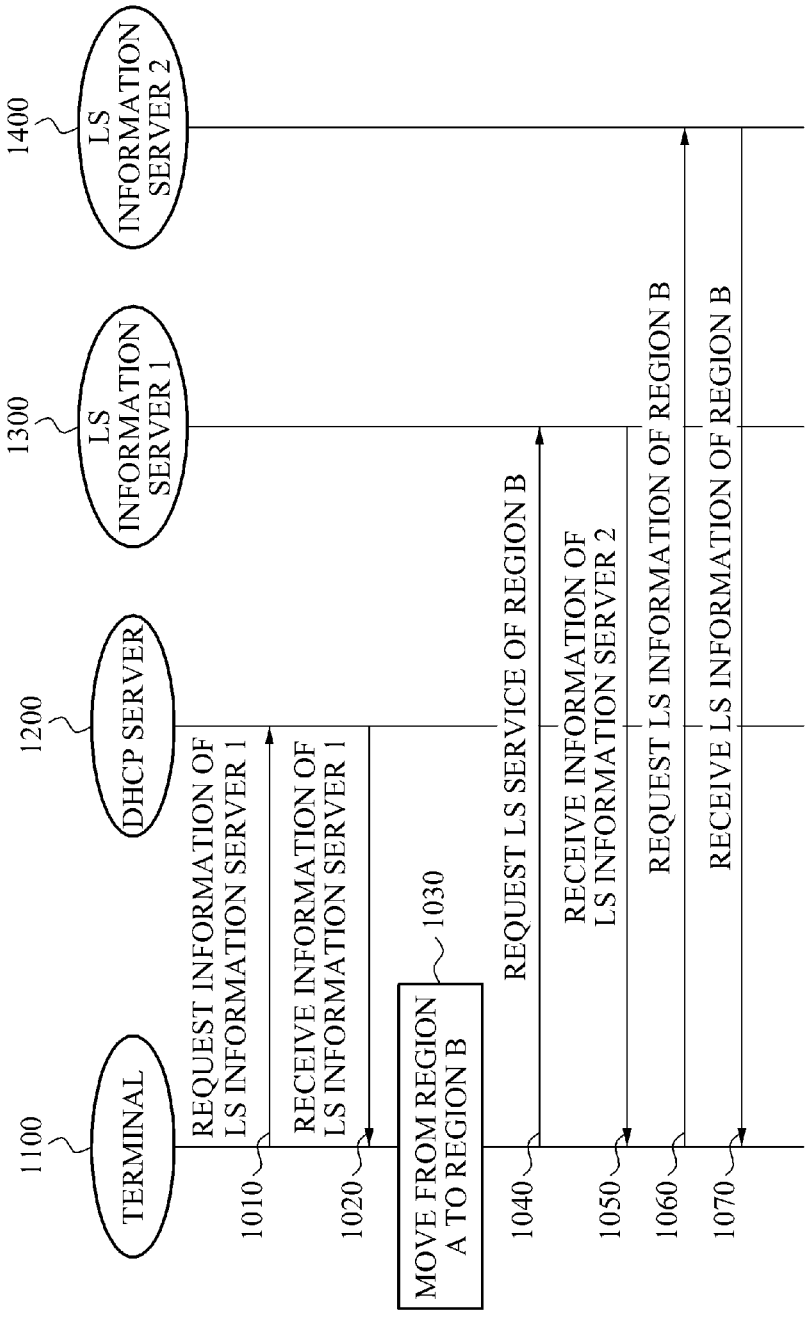

1100
TERMINAL
1200
DHCP SERVER
1300
LS INFORMATION SERVER 1
1400
LS INFORMATION SERVER 2
1010
REQUEST INFORMATION OF LS INFORMATION SERVER 1
1020
RECEIVE INFORMATION OF LS INFORMATION SERVER 1
1030
MOVE FROM REGION A TO REGION B
1040
REQUEST LS SERVICE OF REGION B
1050
RECEIVE INFORMATION OF LS INFORMATION SERVER 2
1060
REQUEST LS INFORMATION OF REGION B
1070
RECEIVE LS INFORMATION OF REGION B

FIG. 11

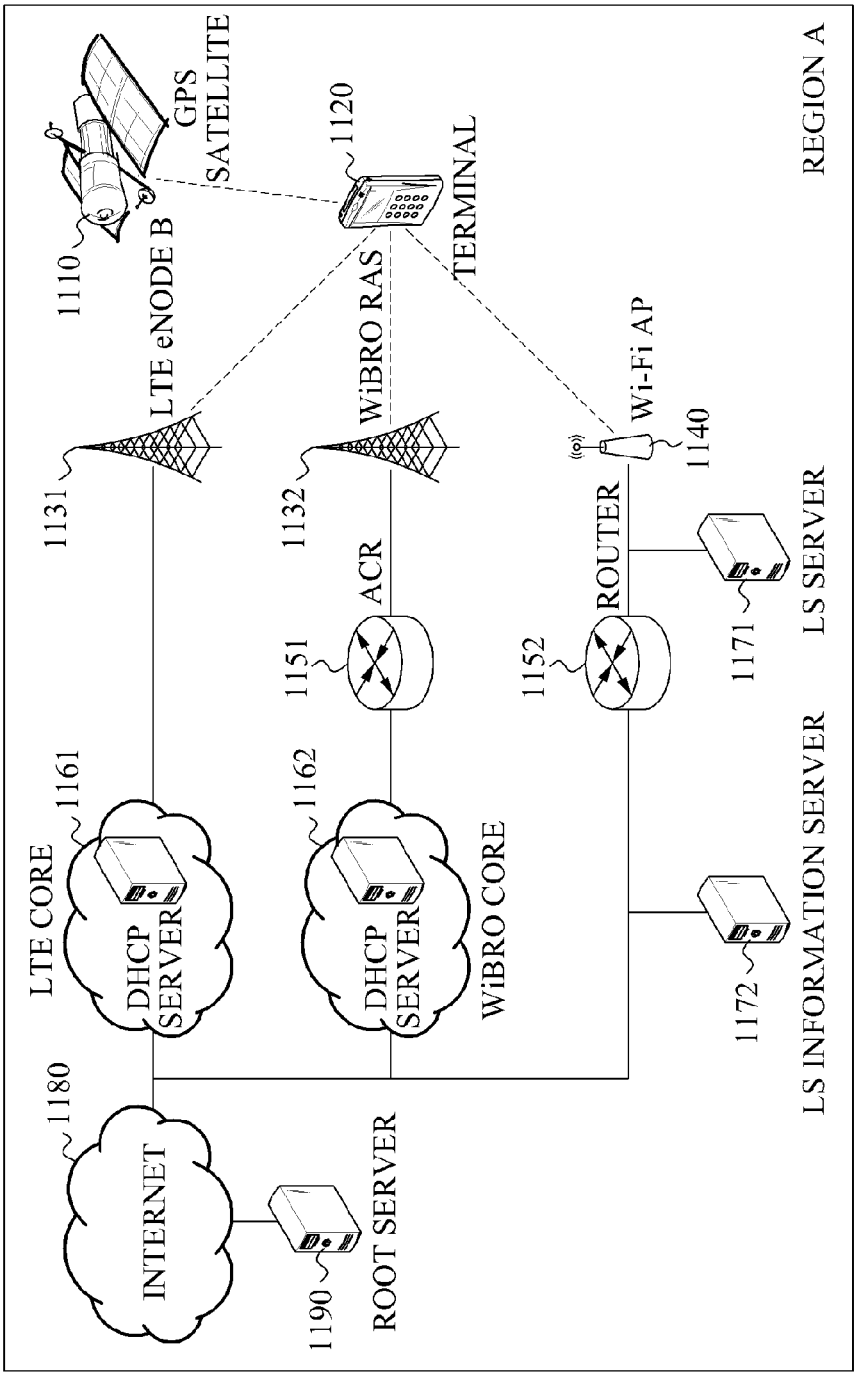
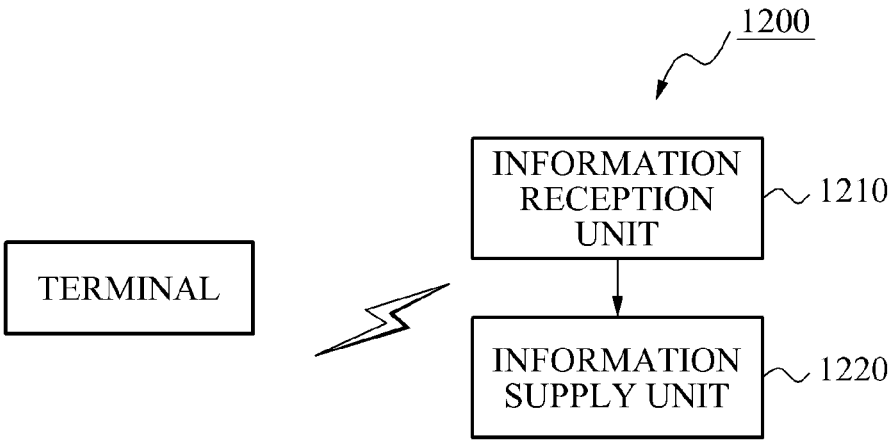

REGION A
GPS SATELLITE
1110
LTE eNODE B
1131
1120
TERMINAL
WiBRO RAS
1132
Wi-Fi AP
1140
ROUTER
1152
ACR
1151
LTE CORE
1161
DHCP SERVER
WiBRO CORE
1162
DHCP SERVER
LS SERVER
1171
LS INFORMATION SERVER
1172
INTERNET
1180
ROOT SERVER
1190

FIG. 12


1200
INFORMATION RECEPTION UNIT
1210
TERMINAL
INFORMATION SUPPLY UNIT
1220

METHOD FOR SUPPLYING LOCAL SERVICE USING LOCAL SERVICE INFORMATION SERVER BASED ON DISTRIBUTED NETWORK AND TERMINAL APPARATUS

CROSS-REFERENCE TO RELATED APPLICATION(S)

This application claims the benefit under 35 U.S.C. §119 (a) of Korean Patent Application No. 10-2010-0078829, filed on Aug. 16, 2010, in the Korean Intellectual Property Office, the entire disclosure of which is incorporated herein by reference for all purposes.

BACKGROUND

1. Field The following description relates to a technology for providing a local service (LS) to a terminal using an LS information server based on a distributed network.

2. Description of Related Art

With the development of mobile communication and near field communication (NFC) technologies, the Internet has become accessible to a terminal at just about anytime and anywhere. A terminal is capable of being supplied with a local service (LS) that is provided in a region where the terminal is located.

In a centralized network structure, a central server may supply the terminal with information about the LS of a plurality of regions. In this example, the central server may be located in the Internet and the terminal may freely connect to the server regardless of time and place.

However, if a plurality of terminals request LS information of regions in which the respective terminals are located, excessive traffic may occur on the central server, causing a single point of failure (SPOF). In this example, the entire centralized network may not operate.

Accordingly, there is a demand for a technology that is capable of supplying LSs to a plurality of terminals by dispersing and/or reducing the traffic concentrated on the central server.

SUMMARY

In one general aspect, there is provided a method for providing a local service (LS), the method including acquiring position information of a terminal, requesting an LS information server for LS information about a region in which the terminal is located by inserting the acquired position information of the terminal in a field of a message and transmitting the message to the LS information server, receiving LS information, and displaying the LS information received in response to the request.

The LS information server may be a distributed LS information server.

The method may further comprise requesting the LS information server for remote LS information, displaying the remote LS information received from the LS information server, and supplying a LS selected from the displayed remote LS information.

The LS information server and at least one neighboring LS information server may share LS information about a region in which the LS information server is located and the LS information of a region in which the neighboring LS information server is located, and the neighboring LS information server may be located in a region that is adjacent to the region in which the terminal is located.

The receiving LS information may comprise receiving information about a root server from the LS information server, in response to the request for the remote LS information, and the method may further comprise requesting, based on the received root server information, remote LS information from the root server, displaying the remote LS information received from the root server, and supplying a LS selected from the displayed remote LS information.

The receiving LS information may comprise receiving root server information from the LS information server, in response to the request for the remote LS information, and the method may further comprise requesting the root server for information about a neighboring LS information server that is located in a region that is adjacent to the region in which the terminal is located, requesting the neighboring LS information server for remote LS information based on the neighboring LS information server information received from the root server, displaying the remote LS information received from the neighboring LS information server, and supplying a LS selected from the displayed remote LS information.

The receiving LS information may comprise receiving information about a root server from the LS information server, in response to the request for the remote LS information, and the method may further comprise requesting the root server for remote LS information based on the received root server information, receiving information of a neighboring LS information server in response to the requested remote LS information, requesting the neighboring LS information server for the remote LS information based on the received neighboring LS information server information, displaying the remote LS information received from the neighboring LS information server, and supplying a LS selected from the displayed remote LS information.

In response to the terminal moving from a region in which the LS information server is located to a neighboring region in which a neighboring LS information server is located, the method may further comprise requesting the LS information server for LS information about the region in which the terminal is located, receiving information of the neighboring LS information server that is located in the neighboring region, from the LS information server, requesting the neighboring LS information server for the LS information about the region in which the terminal is located based on the received neighboring LS information, and receiving an LS information of the region in which the terminal is located from the neighboring LS information server.

The method may further comprise displaying the LS information, wherein the LS information includes at least one of summaries of the LS, a method for connection to the localized wireless network (LWN), a method for connection with the LS server, and use of the LS.

The method may further comprise requesting a dynamic host configuration protocol (DHCP) server for information about the LS information server, wherein the requesting of the LS information comprises requesting the LS information about the region in which the terminal is located based on the LS server information received in response to the request.

In another aspect, there is provided a terminal including a position information acquisition unit to acquire position information of the terminal, an information request unit to request a LS information server for information about a region in which the terminal is located, by inserting the acquired terminal position information into a message, and an information supply unit to supply a LS selected by a user, based on received LS information.

The information request unit may request the LS information server for remote LS information, and the information

supply unit may display the remote LS information received from the LS information server and supply a LS selected from the displayed remote LS information.

The LS information server and at least one neighboring LS information server may share LS information of a region in which the LS information server is located and the LS information of a region in which the neighboring LS information server is located, and the neighboring LS information server may be located in a region that is adjacent to the region in which the terminal is located.

The information supply unit may comprise an information reception unit to receive information of a root server in response to remote LS information requested from the LS information server, and to receive the remote LS information requested from the root server, a display unit to display the received remote LS information, and a connection unit to connect the terminal to the LS selected based on the displayed remote LS information.

The information supply unit may comprise an information reception unit to receive information of a root server, and to receive information of a neighboring LS information server from the root server, and a display unit to display the remote LS information received from the neighboring LS information server.

The information request unit may request the LS information server for LS information of the region in which the terminal is located and request a second LS information server located in the neighboring region for the LS information about the region in which the terminal is located, and the information supply unit may supply LS information about the region in which the terminal is located, received from the second LS information server.

The terminal may further comprise a display unit to display the LS information, wherein the LS information comprises at least one of summaries of the LS, a method for connection to the LWN, a method for connection with the LS server, and use of the LS.

The information request unit may request a DHCP server for information about the LS information server and request for the LS information of the region in which the terminal is located based on the LS server information received in response to the request.

In another aspect, there is provided an LS information server including an information reception unit to receive position information of a terminal and a request for LS information about a region in which the terminal is located, and to receive a request for remote LS information from the terminal, and an information supply unit to transmit the requested LS information to the terminal, and to supply at least one of information of a neighboring LS information and the remote LS information.

The LS information about the region in which the terminal is located may be shared with the remote LS information supplied by the neighboring LS information server, and the LS information server and the neighboring LS information server may be distributed servers.

The information supply unit may supply information of a root server to the terminal, in response to the received request for the remote LS information.

Other features and aspects may be apparent from the following detailed description, the drawings, and the claims.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. **1** is a diagram illustrating an example of a distributed network that includes a plurality of local service (LS) information servers and a terminal.

FIG. **2** is a flowchart illustrating an example of a method for supplying LS information to the terminal using a distributed LS information server.

FIG. **3** is a diagram illustrating an example of a terminal based on a distributed network.

FIG. **4** is a diagram illustrating another example of a distributed network that includes a plurality of distributed LS information servers.

FIG. **5** is a diagram illustrating an example of a process for supplying LS information of a region in which a terminal is located.

FIG. **6** is a flowchart illustrating an example of a process for supplying remote LS information using an LS information server, a root server, and a neighboring LS information server.

FIG. **7** is a flowchart illustrating an example of a process of a terminal receiving the remote LS information from the LS information server.

FIGS. **8** and **9** are flowcharts illustrating an example of receiving remote LS information by requesting information from the neighboring LS information server.

FIG. **10** is a flowchart illustrating an example of process for supplying an LS based on a location change of the terminal in the distributed network of FIG. **4**.

FIG. **11** is a diagram illustrating an example of network in which a terminal located in a pico cell supplies the LS.

FIG. **12** is a diagram illustrating an example of an LS information server.

Throughout the drawings and the detailed description, unless otherwise described, the same drawing reference numerals should be understood to refer to the same elements, features, and structures. The relative size and depiction of these elements may be exaggerated for clarity, illustration, and convenience.

DETAILED DESCRIPTION

The following detailed description is provided to assist the reader in gaining a comprehensive understanding of the methods, apparatuses, and/or systems described herein. Accordingly, various changes, modifications, and equivalents of the methods, apparatuses, and/or systems described herein may be suggested to those of ordinary skill in the art. Also, descriptions of well-known functions and constructions may be omitted for increased clarity and conciseness.

FIG. **1** illustrates an example of a distributed network including a plurality of local service (LS) information servers and a terminal.

Referring to FIG. **1**, terminal **10** may be a mobile terminal, for example, an IPHONE®, a smart phone, a digital multimedia broadcasting (DMB) phone, a net book, a notebook computer, a navigator, a personal computer, a laptop computer, and the like.

The distributed network in FIG. **1** includes a localized wireless network (LWN) base station **42** that supplies a communication connection between an LWN **40** and the terminal **10**, a plurality of local service (LS) information servers **41** that supply LS information, and a wideband wireless network (WWN) base station **20** that supplies a communication connection for the terminal **10** to access the Internet **30**. In this example, the plurality of LS information servers **41** are disposed in each of a plurality of regions included in the distributed network. For example, the LS information servers **41** may store the LS information of corresponding regions, in a database. For example, the LWN may include wireless networks such as a WI-FI® hot spot, a BLUETOOTH® hot spot, a femto cell, a pico cell, and the like.

The terminal **10** may be capable of performing voice communication, video communication, and data communication using the WWN. The terminal **10** may acquire LS information using the WWN and then use the selected LS using the LWN **40**. For example, the LS may include an information guide service for a region in which the terminal **10** is located, a coupon service that supplies coupons of stores located in the region, a ticketing service for purchase of tickets from stores that are located within the region, and the like. The information guide service may include information about stores that are located in the region, information about tourist spots, information about a history of the region, traffic information of the region, and the like.

Although FIG. **1** illustrates the distributed network including a single terminal for convenience of description, the distributed network is not limited thereto and may include a plurality of terminals. For example, LS information servers of the region in which the plurality of terminals are located may supply LS information of the corresponding regions to the plurality of terminals, respectively.

Hereinafter, an example of supplying the LS information to a terminal using a distributed LS information server is further described with reference to FIG. **2**.

FIG. **2** illustrates an example of a method for supplying LS information to the terminal using the distributed LS information server.

FIG. **3** illustrates an example of a terminal based on a distributed network.

Referring to FIG. **3**, terminal **300** includes a server search unit **310**, a position information acquisition unit **320**, an information request unit **330**, and an information supply unit **340**. In this example, the information supply unit **340** includes an information reception unit **341**, a display unit **342**, and a connection unit **343**.

Referring to FIGS. **2** and **3**, in **210**, the position information acquisition unit **320** acquires information on a position of the terminal using, for example, a global positioning system (GPS) module (not shown) that may be built in the terminal **300**.

For example, the position information acquisition unit **320** may acquire the position information of the terminal **300** through communication between the GPS module and a GPS satellite (not shown) to obtain position coordinates.

In **220**, the server search unit **310** searches for an LS information server **1500** that is in a region in which the terminal **300** is located. In this example, the LS information server **1500** may be located in the region in which the terminal **300** is located.

In **230**, the information request unit **330** transmits the position information of the terminal that is acquired by the searched LS information server **1500**. For example, the LS information server **1500** may transmit the LS information of the terminal-located region to the terminal **300**, based on the position information of the terminal **300**.

The information reception unit **341** receives the LS information of the terminal-located region from the LS information server **1500**, in **240**.

For example, the LS information may include summaries of the LS, a method for connecting to the LWN, a method for connecting with the LS information server **1500**, use information about the LS, and the like. The summaries of the LS may introduce contents of the LS to be supplied, in the form of a webpage. As another example, the summaries of the LS may include at least one of texts, images, video, and music. The method for connecting to the LWN may include an address of the LWN. The method for connecting with the LS information server **1500** may include an address of the LS information server **1500**. The use of the LS may include a port number and a transport protocol.

In **250**, the display unit **342** displays the received LS information of the terminal-located region.

The information supply unit **340** supplies the LS selected based on the received LS information, in **260**.

For example, an operation unit (not shown) may receive a user's selection about the LS based on the LS summaries from among the displayed LS information. In this example, the connection unit **343** may connect with the LWN using the LWN connection method included in the LS information. Also, the connection unit **343** may connect with the LS server that supplies the LS using the LS server connection method that is included in the LS information. Accordingly, the connection unit **343** may achieve a connection with the LS selected through the LWN.

As an example, if the selected LS is the coupon service, the connection unit **343** may connect the terminal **300** to a coupon providing webpage. In this example, the terminal **300** may use the coupon service by printing a coupon, downloading a coupon, and the like.

The terminal **300** may receive remote LS information of a neighboring region of the terminal-located region. For example, the terminal **300** may supply a remote LS that is selected based on the remote LS information. The terminal **300** may supply the remote LS information using, for example, at least one of a neighboring LS information server **1600**, a root server **1400**, and/or the LS information server **1500**, which are further described hereinafter.

FIG. **5** illustrates an example of a process for supplying LS information of a region in which a terminal is located.

Referring to FIG. **5**, terminal **5200** may request an operator of the WWN for the LS information about the LS information server of that is located in the terminal-located region. Because the terminal **5200** has the same structure as the terminal **300** of FIG. **3**, the same elements are cited by the same reference numerals.

Referring to FIGS. **5** and **3**, in **510** the information request unit **330** of the terminal to **5200** requests LS server information from the dynamic host configuration protocol (DHCP) server **5400** using a WWN **5300**. In this example, the DHCP server **5400** may be located in a core network of the WWN **5300**. For example, the WWN **5300** may include a Long-term evolution (LTE), a WiBro network, and the like.

During the request, the information request unit **330** may transmit an option field that requests the LS server information using the option field in a DHCP message to request internet protocol (IP) setting information. For example, the information request unit **330** may request the DHCP server **5400** for the LS server information using the option field of a DHCPDISCOVER message or a DHCPREQUEST message.

As another example, the information request unit **330** may insert the terminal position information in the option field of the DHCPDISCOVER message or the DHCPREQUEST message using a request for comments (RFC) **3825** location configuration information (LCI) DHCP option. The information request unit **330** may transmit the DHCPDISCOVER message or the DHCPREQUEST message, in which the terminal position information is inserted, to the DHCP server **5400**.

In **520**, the information reception unit **341** receives the LS server information from the DHCP server **5400**. For example, the information reception unit **341** may receive the LS server information using a DHCPOFFER message or a DHCPPACK message. The DHCP server **5400** may transmit, to the terminal **5200**, the LS server information that is inserted in an option field of the DHCPOFFER message or the DHCP-

PACK message. The LS server information may include the address of the LS information server, such as an IP address. The DHCPOFFER message and the DHCPPACK message are response messages that are in response to the DHCPDISCOVER message and the DHCPREQUEST message, respectively.

In **530**, the information request unit **330** requests the LS information server **5600** for the LS information about the terminal-located region, based on the received LS server information.

The information reception unit **341** receives the requested LS information from the LS information server **5600** through the Internet **5500**, in **540**. The display unit **342** may display the received LS information. The LS information may include the summaries of the LS, the LWN connection method, the LS information server connection method, use of the LS, and the like.

The connection unit **343** may connect with the LS that is selected based on the displayed LS information. For example, the connection unit **343** may connect to the LS that is selected based on the displayed LS summaries. The connection unit **343** may achieve the connection to the selected LS by connecting to the LS server and to the LWN, respectively, by the LS server connection method and the LWN connection method that are included in the LS information.

Although a request to the WWN operator for the LS server information has been described with reference to FIG. **5**, as another example, the LS server information may be requested by a root server that is located on the Internet. As another example, the terminal may directly acquire the LS server information using a multicast protocol.

The process of receiving the LS information of the terminal-located region from the LS information server **5600** has been described with reference to FIG. **5**. Hereinafter, a process of receiving the remote LS information as well as the LS information of the terminal-located region is described with reference to FIGS. **6** through **9**.

FIG. **6** illustrates an example of a process for supplying remote LS information using an LS information server, a root server, and a neighboring LS information server.

Referring to FIG. **6**, the information request unit **330** of terminal **6100** requests the DHCP server **6200** for the LS server information, in **610**.

For example, the information request unit **330** may transmit terminal position information to the DHCP server **6200** by inserting the terminal position information in a message and requesting the LS server information.

In **620**, the information reception unit **341** receives the LS server information. For example, the LS server information may include the address of the LS information server, such as the IP address.

In **630**, the information request unit **330** requests the LS information server **6300** for the remote LS information, based on the received LS server information. In this example, the remote LS information may be LS information that is supplied by the neighboring region of the region in which terminal **6100** is located.

In **640**, the information reception unit **341** receives information about the root server **6400** from the LS information server **6300**.

In this example, if the remote LS information is not stored in the LS information server **6300**, the LS information server **6300** may transmit the root server information to the terminal **6100**. For example, the root server information may include an address of the root server **6400**. The root server **6400** may be a public server that provides information about LS information servers that are located in each region of the Internet. In this example, the root server **6400** may be a server that is aware of information about all LS information servers that are located in each region.

In **650**, the information request unit **330** requests the root server **6400** for the remote LS information based on the received root server information.

The information reception unit **341** receives information about the neighboring LS information server **6500** from the root server **6400**, in **660**.

If the remote LS information is not stored in the root server **6400**, the root server **6400** may transmit information about the neighboring LS information server **6500** to the terminal **6100**. For example, the information about the neighboring LS information server **6500** may include an address of the neighboring LS information server **6500**.

The information request unit **330** requests the neighboring LS information server **6500** for the remote LS information based on the received information about the neighboring LS information server **6500**, in **670**.

For example, the remote LS information may include summaries of the LS that are supplied by a region in which the neighboring LS information server **6500** is located, a method of connecting to an LWN of the region in which the neighboring LS information server **6500** is located, a method of connecting to the neighboring LS server **6500**, and use of the LS of the region in which the neighboring LS information server **6500** is located.

In **680**, the information reception unit **341** receives the remote LS information from the neighboring LS information server **6500**. Accordingly, the display unit **342** may display the received remote LS information. In addition, the connection unit **343** may connect to the remote LS selected based on the displayed remote LS information. In this example, the remote LS may be selected by the user through an operation unit (not shown) provided at the terminal or a remote controller for controlling the operation of the terminal **6100**.

In **660**, if the root server **6400** stores the remote LS information, the root server **6400** may directly transmit the remote LS information to the terminal **6100**. In this example, operations **670** and **680** may be omitted. Also, the information reception unit **341** may receive the remote LS information from the root server **6400**, and the display unit **342** may display the received remote LS information. Accordingly, the connection unit **343** may connect to the remote LS selected using the remote LS information.

FIG. **7** illustrates an example of a terminal receiving remote LS information from an LS information server. In this example, operations **710** to **730** are the same as operations **610** and **630** of FIG. **6**, and a further description thereof omitted.

Referring to FIG. **7**, the information request unit **330** of terminal **7100** requests the LS information server **7300** for the remote LS information, in **730**.

If the LS information server **7300** stores the remote LS information, the LS information server **7300** may transmit the remote LS information to terminal **7100**. For example, the LS information server **7300** may share the LS information of the region in which the LS information server **7300** is located, with the neighboring LS information servers located in each region. In this example, the neighboring LS information servers and the LS information server **7300** may share the LS information of the region in which the neighboring LS information servers are located and the region in which the LS information server **7300** is located.

The information reception unit **341** receives the remote LS information from the LS information server **7300**, in **740**. The display unit **342** may display the received remote LS infor-

mation. In addition, the connection unit **343** may connect to the remote LS selected using the remote LS information.

FIGS. **8** and **9** illustrate examples of receiving remote LS information by requesting information about the neighboring LS information server. In the example shown in FIG. **8**, a process of receiving the remote LS information based on the information about the neighboring LS information server, instead of the remote LS information, that is requested from a root server **8400** such as shown in operation **650** of FIG. **6**. In this example, operations **810** to **840** of FIG. **8** are the same as operations **610** to **640** of FIG. **6**, and a further description thereof is omitted.

In **840**, the information reception unit **341** of terminal **8100** receives the root server information from an LS information server **8300**, in response to the request for the remote LS information.

In **850**, the information request unit **330** requests the root server **8400** for the information about the neighboring LS information server **8500** based on the received root server information. For example, the information request unit **330** may request the root server **8400** for the address of a neighboring LS information server **8500** that is located in the region which supplies the remote LS information.

In **860**, the information reception unit **341** receives the information about the neighboring LS information server **5500** from the root server **8400**.

In **870**, the information request unit **330** requests the neighboring LS information server **8500** for the remote LS information based on the received information about the neighboring LS information server **8500**.

In **880**, the information reception unit **341** receives the remote LS information from the neighboring LS information server **8500**. The display unit **342** may display the received remote LS information. If the remote LS is selected, for example, based on the remote LS summaries included in the remote LS information, the connection unit **343** may connect to the selected remote LS using the LWN connection method and the neighboring LS server connection method that are included in the remote LS information.

In this example, if the root server **8400** stores the remote LS information in operation **840**, the remote LS information may be directly transmitted to the terminal **8100**.

As another example, in **830**, the information request unit **330** may request the LS information server **8300** for the information about the neighboring LS information server **8500** instead of the remote LS information.

Referring to the example of FIG. **9**, the information request unit **330** of terminal **9100** requests an LS information server **9300** for the information about the neighboring LS information server **9500**, in **930**, and the information reception unit **341** receives the neighboring LS information server information from the LS information server **9300**, in **940**. In this example, the information request unit **330** requests the remote LS information from a neighboring LS information server **9500**, in **950**, based on the received information about the neighboring LS information server **9500**. In addition, the information reception unit **341** receives the remote LS information from the neighboring LS information server **9500**, in **960**.

In FIGS. **6** and **9**, because the terminal is aware of the root server information in advance, the information request unit **330** may directly transmit the remote LS information to the root server. For example, because the terminal is aware of the address of the root server, operations **630**, **640**, **830**, and **840** may be omitted. In this example, if the terminal is aware of the root server information in advance, the information request unit **330** may directly request the root server for the neighboring LS information server information.

FIG. **10** illustrates an example of a process for supplying an LS based on a location change of the terminal in the distributed network of FIG. **4**.

Hereinafter, a process of supplying the LS to a terminal **1100** as the terminal **1100** located in region A moves to region B. In this example, a first LS information server **1300** is located in region A and a second LS information server **1400** is located in region B.

Referring to FIG. **10**, the information request unit **330** of terminal **100** requests the DHCP server **1200** for information about the LS information server of the region in which the terminal **1100** is located, in **1010**. Because the terminal **1100** is located in region A, the information request unit **330** may request the DHCP server **1200** for information about the first LS information server **1300**.

The information request unit **330** may request the first LS server information from the DHCP server **1200** located in the WWN. For example, the first LS server information may include an address of the first LS information server. In this example, the information request unit **330** may request the address of the first LS information server.

In **1020**, the information reception unit **341** receives the first LS server information from the DHCP server **1200** in **1020**. For example, the information reception unit **341** may receive the first LS server information through the WWN.

In the example of FIG. **10**, the terminal **1100** moves from the region A to the region B while continuously using the Internet, in **1030**. In **1040**, the information request unit **330** requests the first LS information server **1300** for the LS information of the region where the terminal is located region.

As a result of the movement of the terminal **1100** from region A to region B, the terminal **1100** may now be located in region B. Accordingly, the information request unit **330** may request the first LS information server **1300** for the LS information of the region in which the terminal is currently located. In this example, the first LS information server **1300** is an LS information server located in region A where the terminal **1100** was located before moving to region B.

The information reception unit **341** receives information about the second LS information server **1400** from the first LS information server **1300**, in **1050**. For example, the second LS server information may include an address of the second LS information server **1400**. In addition, the LS information of region B may already be stored in the second LS information server **1400**.

In **1060**, the information request unit **330** requests the second LS information server **1400** for the LS information of region B, based on the second LS server information.

The information reception unit **341** receives the LS information of region B from the LS information server **1400**, in **1070**. Therefore, the display unit **342** may display the received LS information of region B. In addition, the connection unit **343** may connect to an LS of region B that may be selected based on the LS information of region B. For example, the connection unit **343** may connect to the LS of region B selected based on the region B LWN connection method and the second LS server connection method.

In **1050** of FIG. **10**, the information reception unit **341** may also receive the LS information of region B and the second LS server information from the first LS information server **1300**. In this example, operations **1060** and **1070** of FIG. **10** may be omitted. For example, to receive the LS information of region B and the second LS server information from the first LS information server **1300**, the first LS information server **1300**

and the second LS information server **1400** may share the LS information of region A and the LS information of region B with each other.

As another example, in **1050** of FIG. **10**, the information reception unit **341** may receive the root server information from the first LS information server **1300**. Accordingly, the information request unit **330** may receive the LS information of the region B directly from the root server, or from the second LS information server **1400** using the second LS information server received from the root server.

Also, the LS information of region B may be transmitted to the terminal **1100** directly from the first LS information server **1300** that is located in region A. For example, if the first and the second LS information servers **1300** and **1400** share the LS information, and the terminal **1100** moves from region A to region B while continuously using the Internet, the information reception unit **341** may directly receive the LS information of region B from the first LS information server **1300**.

FIG. **11** illustrates an example of a network in which a terminal located in a pico cell supplies the LS.

Referring to FIG. **11**, the distributed network includes the LWN, the WWN, and the Internet **1180**. The LWN may be used to supply the terminal located in the LWN with the LS which is on the basis of a wireless local area network (LAN). The WWN may include a WiBro network. The WiBro network may supply a service that enables a terminal **1120** to connect to the Internet **1180**. For example, the terminal **1120** may connect to a WiBro Core network through a WiBro radio access station (RAS) and a WiBro access control router (ACR). The WiBro core network may supply internet access service that enables the terminal **1120** to connect to the internet.

In addition, referring to FIG. **11**, the root server **1190** may be located on the Internet **1180**. An LS information server **1172** may also be located in the Internet **1180** and may not be subordinate to a specific WWN. An LS server **1171** may be located on the LWN. Hereinafter, a process of supplying the LS by the terminal located in a WiBro Pico cell is further described.

First, an LS search program stored in the terminal **1120** may be executed by the user. For example, the position information acquisition unit **320** of the terminal **1120** may acquire information about a current position of the terminal **1120** from a GPS satellite **120**. For example, the terminal position information may include position coordinates of the terminal, and the position coordinates may be expressed by a DMS (Document Management Server) method using a world geodetic system (WGS)-84 coordinates system.

The connection unit **343** may connect to the WiBro core network through the WiBro RAS **1132** and the WiBro ACR **1151**.

Accordingly, the information request unit **330** may request the LS server information from the DHCP server **1162** that is located in the WiBro core network. For example, a message requesting the IP setting information may include the terminal position information that is acquired, along with the request for the LS information server information. In this example, the information request unit **330** may request the DHCP server **1162** for the IP setting information including the LS information server information.

The information reception unit **341** may receive the IP setting information from the DHCP server **1162**. For example, the IP setting information may include the LS information server information. For example, the LS server information may include an IP address of the LS information server and a TCP/UDP (Transmission Control Protocol/user datagram protocol) port number.

The information request unit **330** may request the LS information server **1172** for the LS information using the LS server information. For example, if the remote LS information is requested, the information request unit **330** may request a neighboring LS information server (not shown) for the remote LS information through the WiBro wireless network and the Internet **1180**. Therefore, the LS information server **1172** or the neighboring LS information server (not shown) may transmit, to the terminal **1120**, the LS information or the remote LS information, in response to the request by the terminal **1120**.

For example, the connection unit **343** may connect to the WiBro core network through the WiBro RAS **1132** and the WiBro ACR **1151** and may acquire the IP address of the LS information server from the DHCP server that is located in the WiBro core network. Accordingly, the information request unit **330** and the information reception unit **341** may acquire the LS information of neighboring regions of the LS information server, from the LS information server. The display unit **342** My display the LS information acquired from the LS information server.

As an example, if a theme park guide service is selected among the displayed LS information, the connection unit **343** may connect to a wireless LAN access point (AP) in which a service set identification (SSID) is LOCAL_WLAN_API1, using the LS information. Therefore, the information reception unit **341** may receive the IP setting information from the wireless AP using the DHCP protocol. The received IP setting information may include, for example, an IP address and a subnet mask. In addition, the connection unit **343** may connect to an LS information server 10.0.0.x using the LS information. Accordingly, the terminal **1120** may use the LS by using the received LS information. In this example, the LS may be supplied in the form of a webpage. For example, a uniform resource locator (URL) of the webpage may be http://10.0.0.x/8080.

FIG. **12** illustrates an example of an LS information server.

Referring to FIG. **12**, LS information server **1200** may be a distributed LS information server that is distributed to each region.

An information reception unit **1210** may receive a request, from a terminal or another server, for the LS information of the region in which a terminal is located. For example, the information reception unit **1210** may receive the LS information request in which the terminal position information is inserted. An information supply unit **1220** may transmit the requested LS information to the terminal or to another server.

In addition, the information reception unit **1210** may receive a request for the remote LS information. Accordingly, the information supply unit **1220** may transmit the remote LS information to the terminal in response to the request by the terminal. For example, to transmit the remote LS information to the terminal, the LS information server **1200** may share the LS information with one or more neighboring LS information servers that are located in neighboring regions. The LS information server **1200** may share the LS information of the respective neighboring LS information servers that are located in different regions from the LS information server **1200**.

The information supply unit **1220** may transmit the root server information to the terminal, in response to the request for the remote LS information by the terminal For example, the root server information may include the address of the root server. The root server may be a public server which is located in the Internet and which is adapted to store addresses of the plurality of LS information servers that are located in each region in the distributed network.

The processes, functions, methods, and/or software described herein may be recorded, stored, or fixed in one or more computer-readable storage media that includes program instructions to be implemented by a computer to cause a processor to execute or perform the program instructions. The media may also include, alone or in combination to with the program instructions, data files, data structures, and the like. The program instructions recorded on the media may be those specially designed and constructed, or they may be of the kind well-known and available to those having skill in the computer software arts. Examples of computer-readable storage media include magnetic media such as hard disks, floppy disks, and magnetic tape; optical media such as CD ROM disks and DVDs; magneto-optical media such as optical disks; and hardware devices that are specially configured to store and perform program instructions, such as read-only memory (ROM), random access memory (RAM), flash memory, and the like. Examples of program instructions include both machine code, such as produced by a compiler, and files containing higher level code that may be executed by the computer using an interpreter. The described hardware devices may be configured to act as one or more software modules that are recorded, stored, or fixed in one or more computer readable storage media, in order to perform the operations and methods described above, or vice versa. In addition, a computer-readable storage medium may be distributed among computer systems connected through a network and computer-readable codes or program instructions may be stored and executed in a decentralized manner.

As a non-exhaustive illustration only, the terminal device described herein may refer to mobile devices such as a cellular phone, a personal digital assistant (PDA), a digital camera, a portable game console, an MP3 player, a portable/personal multimedia player (PMP), a handheld e-book, a portable laptop personal computer (PC), a global positioning system (GPS) navigation, and devices such as a desktop PC, a high definition television (HDTV), an optical disc player, a setup box, and the like, capable of wireless communication or network communication consistent with that disclosed herein.

A computing system or a computer may include a microprocessor that is electrically connected with a bus, a user interface, and a memory controller. It may further include a flash memory device. The flash memory device may store N-bit data via the memory controller. The N-bit data is processed or will be processed by the microprocessor and N may be 1 or an integer greater than 1. Where the computing system or computer is a mobile apparatus, a battery may be additionally provided to supply operation voltage of the computing system or computer.

It should be apparent to those of ordinary skill in the art that the computing system or computer may further include an application chipset, a camera image processor (CIS), a mobile Dynamic Random Access Memory (DRAM), and the like. The memory controller and the flash memory device may constitute a solid state drive/disk (SSD) that uses a non-volatile memory to store data.

A number of examples have been described above. Nevertheless, it should be understood that various modifications may be made. For example, suitable results may be achieved if the described techniques are performed in a different order and/or if components in a described system, architecture, device, or circuit are combined in a different manner and/or replaced or supplemented by other components or their equivalents. Accordingly, other implementations are within the scope of the following claims.

What is claimed is:

1. A method for providing a local service (LS), the method comprising:

requesting an LS information server for remote LS information, wherein the remote LS information comprises LS information about a neighboring region of a region in which the LS information server is located;

receiving, from the LS information server, at least one of information about a root server, information about a neighboring LS information server of the neighboring region, and the remote LS information;

requesting, in response to the information about the root server being received from the LS information server, the root server for at least one of the remote LS information and the information about the neighboring LS information server;

requesting, in response to the information about the neighboring LS information server being received from the root server, the neighboring LS information server for the remote LS information based on the received information about the neighboring LS information server; and

receiving the remote LS information from the neighboring LS information server.

2. The method of claim **1**, wherein the LS information server is a distributed LS information server.

3. The method of claim **1**, further comprising:

displaying, in response to the remote LS information being received from the LS information server, the remote LS information received from the LS information server; and

supplying a LS selected from the displayed remote LS information.

4. The method of claim **1**, further comprising:

displaying, in response to the remote LS information being received from the root server, the remote LS information received from the root server; and

supplying a LS selected from the displayed remote LS information.

5. The method of claim **1**, further comprising:

displaying the remote LS information received from the neighboring LS information server; and

supplying a LS selected from the displayed remote LS information.

6. The method of claim **1**, further comprising displaying the remote LS information,

wherein the remote LS information includes at least one of summaries of the remote LS, a method for connection to the localized wireless network (LWN), a method for connection with the remote LS server, and use of an LS.

7. The method of claim **1**, further comprising:

requesting a dynamic host configuration protocol (DHCP) server for information about the LS information server based on a region in which a terminal is located; and

receiving the information about the LS information server from the DHCP server in response to the requested information about the LS information server.

8. The method of claim **1**, further comprising requesting, in response to the information about a neighboring LS information server being received from the LS information server, the neighboring LS information server for the remote LS information.

9. The method of claim **1**, wherein the LS information server and at least one neighboring LS information server share LS information about the region in which the LS information server is located, and

wherein the neighboring region is adjacent to the region in which the terminal is located.

10. A method for providing a local service (LS), the method comprising:

requesting, in response to a terminal being moved from a region in which an LS information server is located to a neighboring region in which a neighboring LS information server is located, the LS information server for LS information about the neighboring region in which the terminal is moved;

receiving information about the neighboring LS information server from the LS information server;

requesting the neighboring LS information server for the LS information about the neighboring region based on the received information about the neighboring LS information server; and

receiving the LS information of the neighboring region from the neighboring LS information server.

11. A terminal comprising:

a position information acquisition unit configured to acquire position information of the terminal;

an information request unit configured to:

request a local service (LS) information server for remote LS information, wherein the remote LS information comprises LS information about a neighboring region of a region corresponding to the position information,

request, in response to information about a root server being received from the LS information server in response to the request for the remote LS information, the root server for at least one of the remote LS information and information about a neighboring LS information server for the neighboring region, and

request, in response to the information about the neighboring LS information server being received from the root server, the neighboring LS information server for the remote LS information based on the received information about the neighboring LS information server; and

an information supply unit configured to supply the remote LS information.

12. The terminal of claim **11**, wherein, in response to the remote LS information being received from the LS information server, the information supply unit displays the remote LS information received from the LS information server and supplies a LS selected from the displayed remote LS information.

13. The terminal of claim **11**, wherein the information supply unit comprises:

an information reception unit to receive remote LS information from the root server;

a display unit to display the remote LS information received from the root server; and

a connection unit to connect the terminal to the LS selected based on the displayed remote LS information.

14. The terminal of claim **11**, wherein the information supply unit comprises:

an information reception unit configured to receive the information about the neighboring LS information server from the root server; and

a display unit configured to display the remote LS information received from the neighboring LS information server.

15. The terminal of claim **11**, further comprising a display unit to display the remote LS information,

wherein the remote LS information comprises at least one of summaries of the remote LS, a method for connection to the LWN, a method for connection with a remote LS information server, and use of a LS.

16. The terminal of claim **11**, wherein the information request unit requests a dynamic host configuration protocol (DHCP) server for information about the LS information server based on a region in which the terminal is located.

17. The terminal of claim **11**, wherein the information request unit is configured to:

request, in response to the terminal being moved from the region in which the LS information server is located to the neighboring region, the LS information server for LS information about the neighboring region, and

request the neighboring LS information server for the LS information about the neighboring region based on the information about the neighboring LS information server.

18. A local service (LS) information server comprising:

an information reception unit configured to receive position information of a terminal and a request for at least one of remote LS information and information about a neighboring LS information server from the terminal, wherein the neighboring LS information server is located in a neighboring region of a region in which the LS information server is located; and

an information supply unit configured to supply at least one of the information about the neighboring LS information server and information about a root server,

wherein, in response to the terminal moving into the neighboring region and the information reception unit receiving a request for LS information about the neighboring region, the information supply unit supplies to the terminal information about the neighboring LS information server.

19. The LS information server of claim **18**, wherein the LS information server and the neighboring LS information server are distributed servers, and

wherein LS information about the region in which the terminal is located is shared with the neighboring LS information server.

20. The LS information server of claim **18**, wherein the information supply unit supplies information about the root server to the terminal, in response to the received request for the remote LS information.

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